Pulsar Observations and Data Analysis

By -
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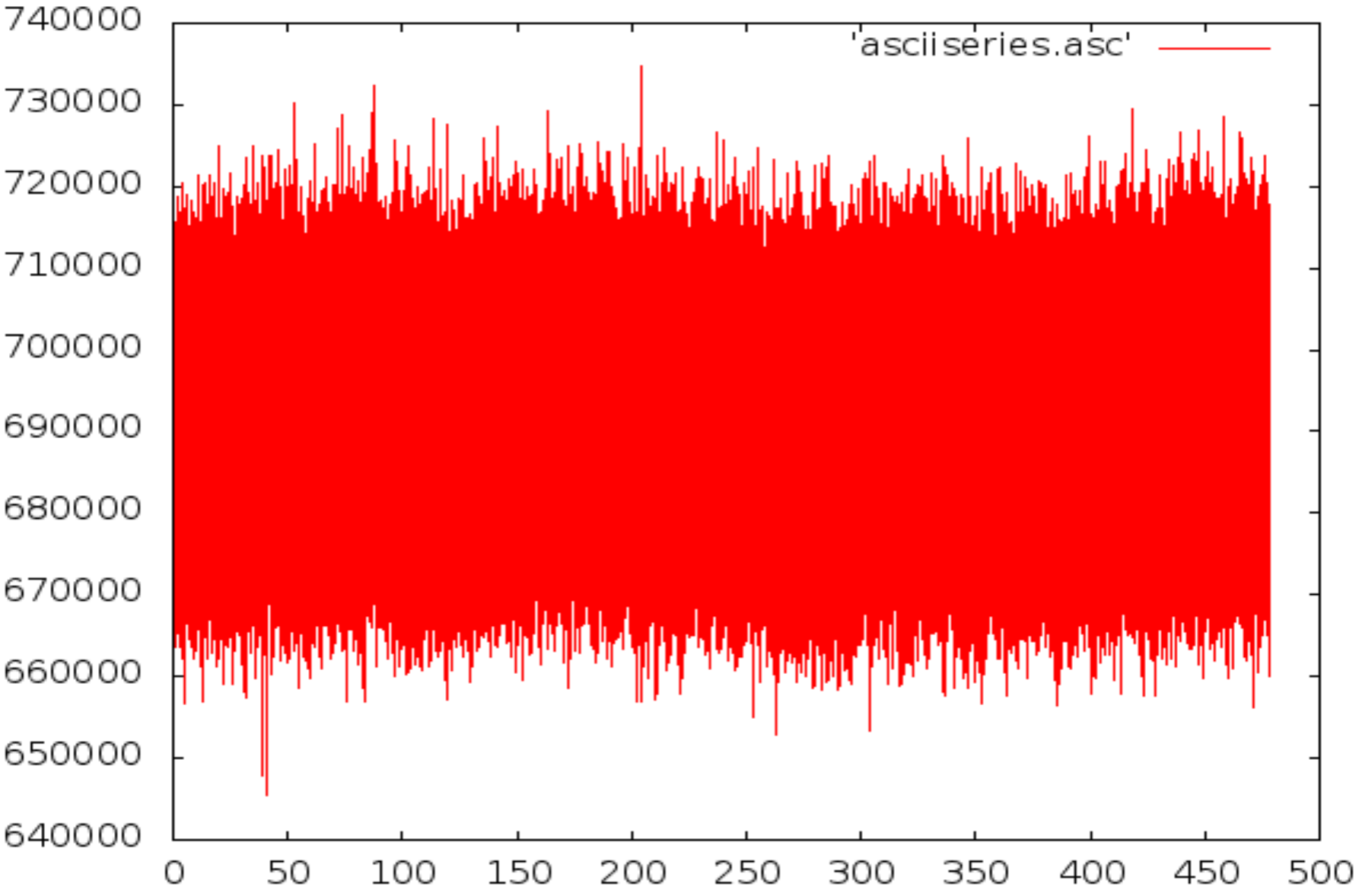
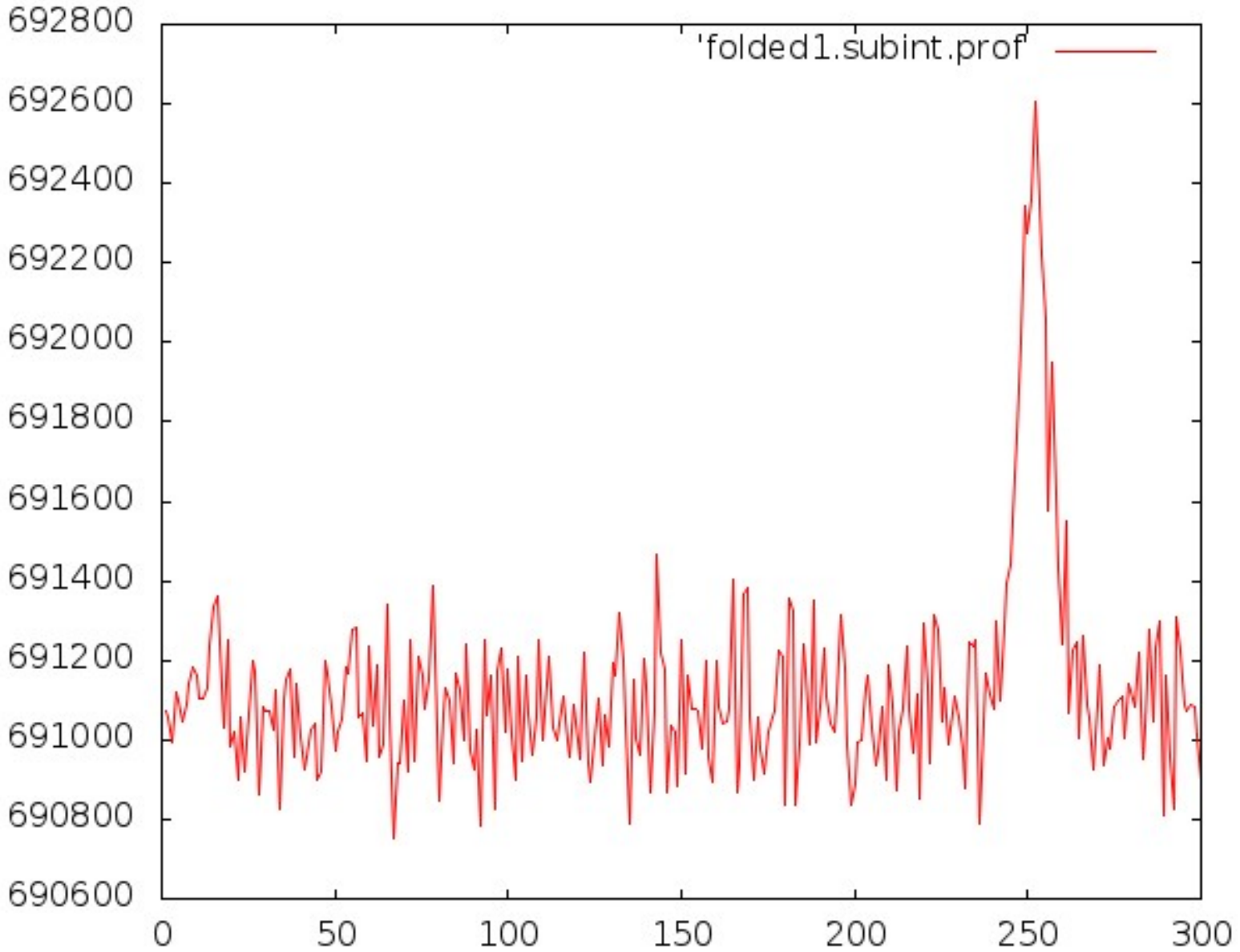
Experiment 1 : Period of pulsar

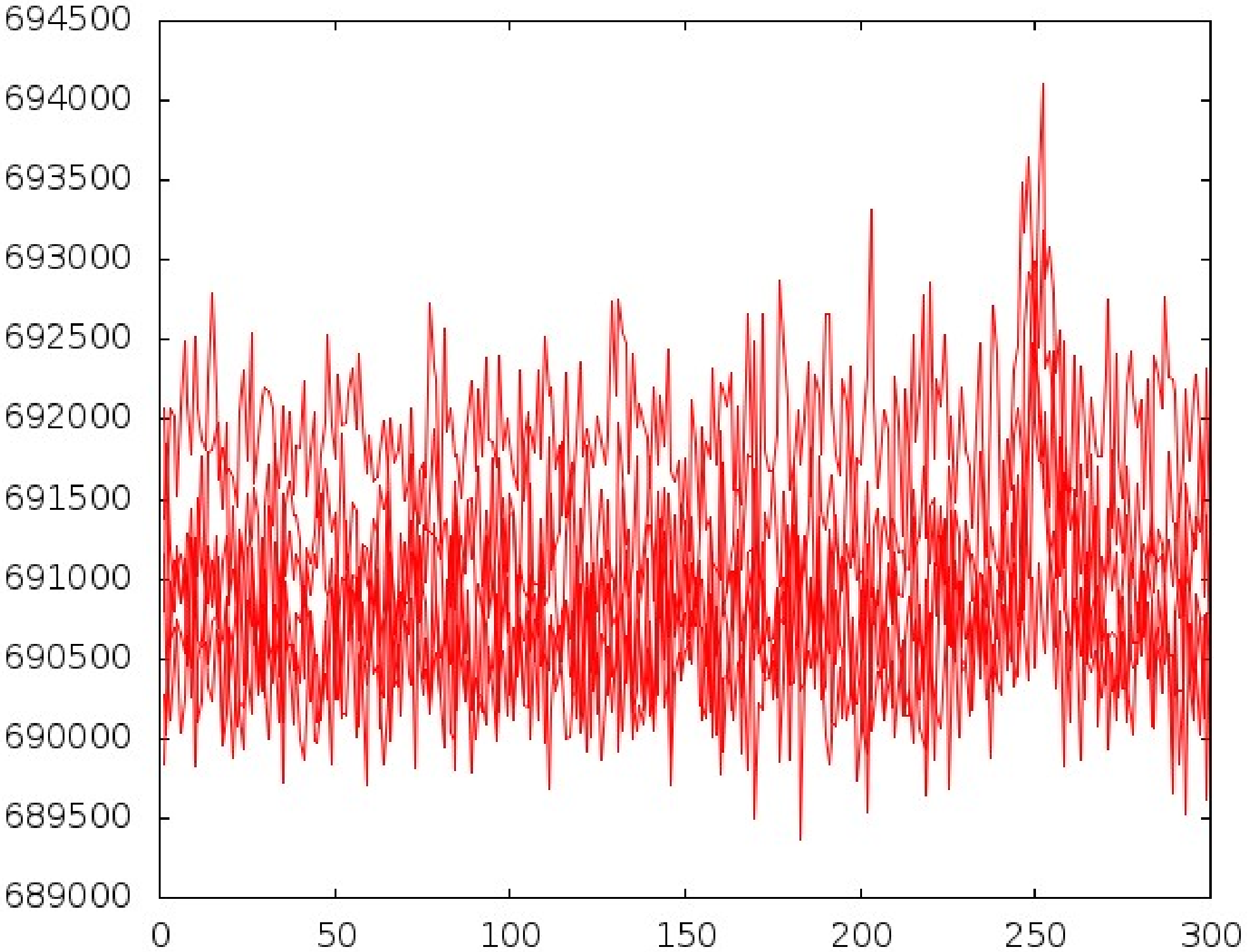
- Dedisperse
- Fold
- Fit Gaussian
- Fit Linear
- Correct

Post – dedispersion (DM = 17.27)



Post – Folding

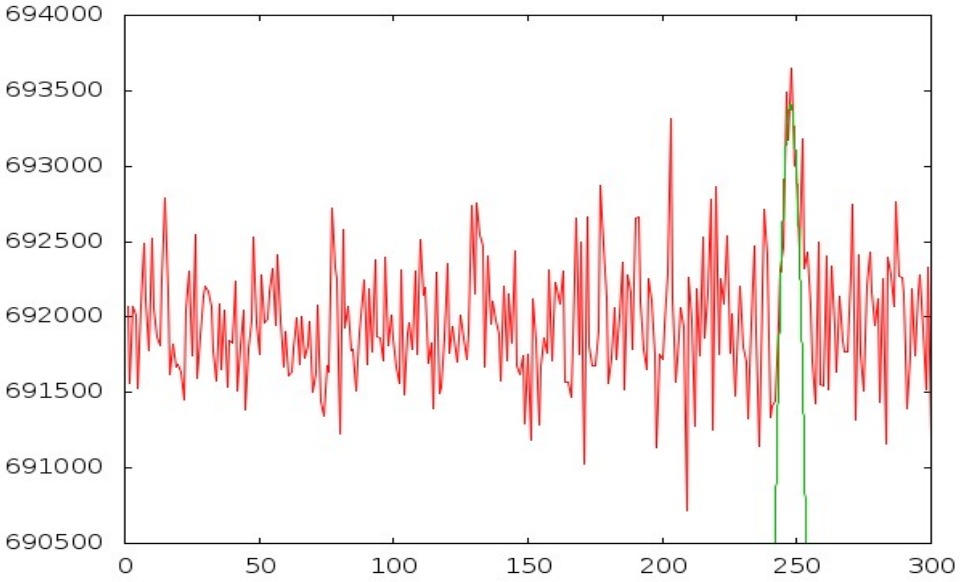


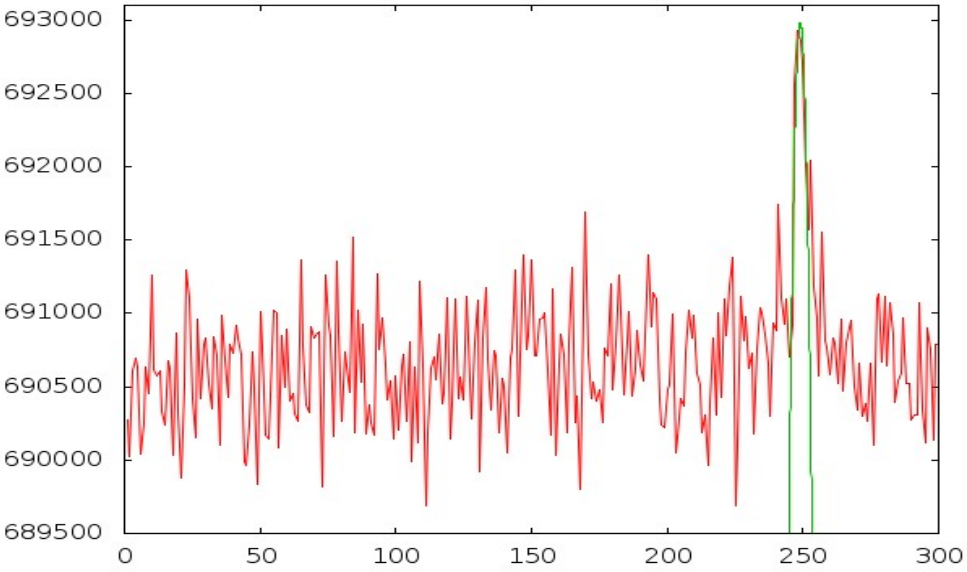

694500
694000
693500
693000
692500
692000
691500
691000
690500
690000
689500
689000
0
50
100
150
200
250
300

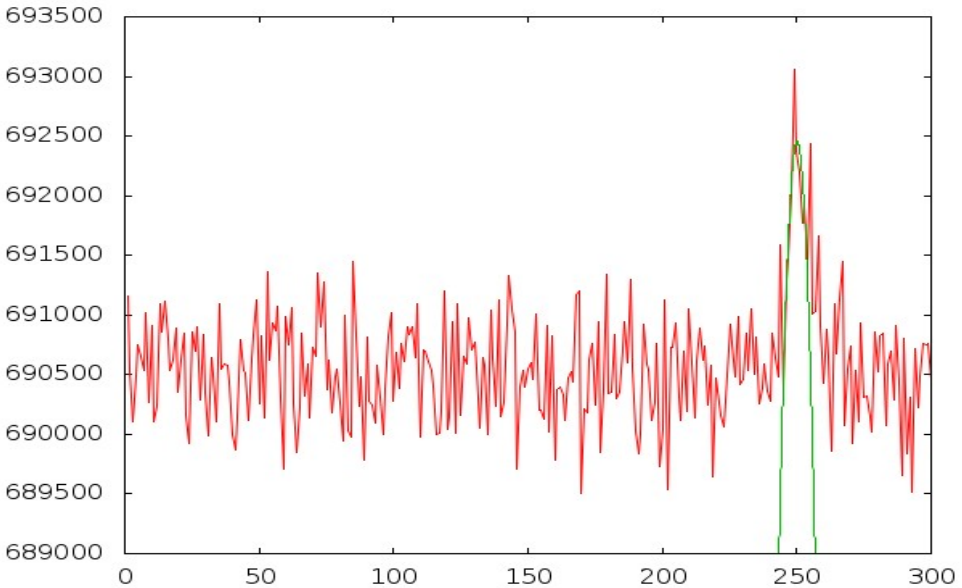
Fold parameters

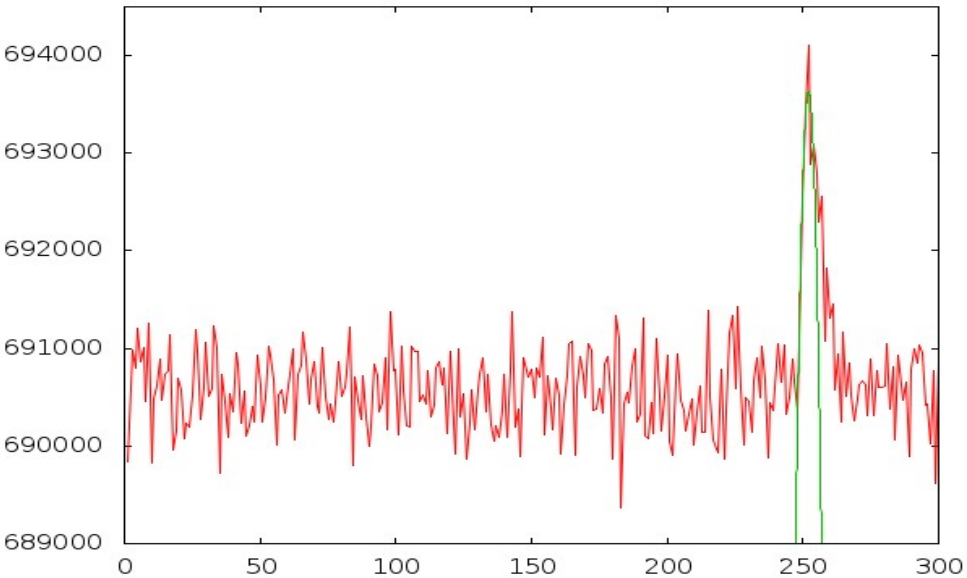
- Rough Period – 349.4 ms
- Bins – 300
- Number of periods - 200

Four profiles with fit (Total 6 profiles)

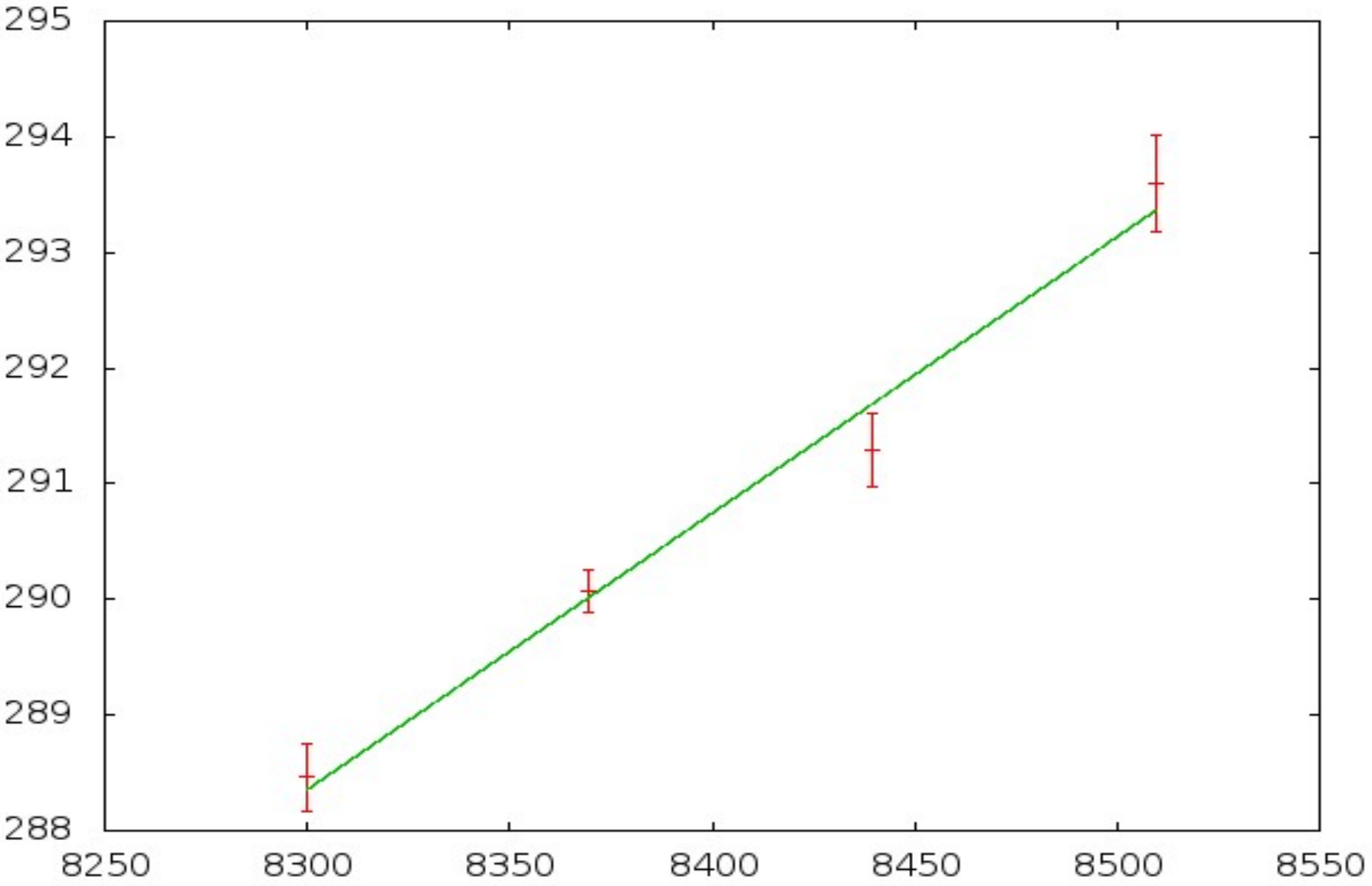








Linear Fit


295
294
293
292
291
290
289
288
8250
8300
8350
8400
8450
8500
8550

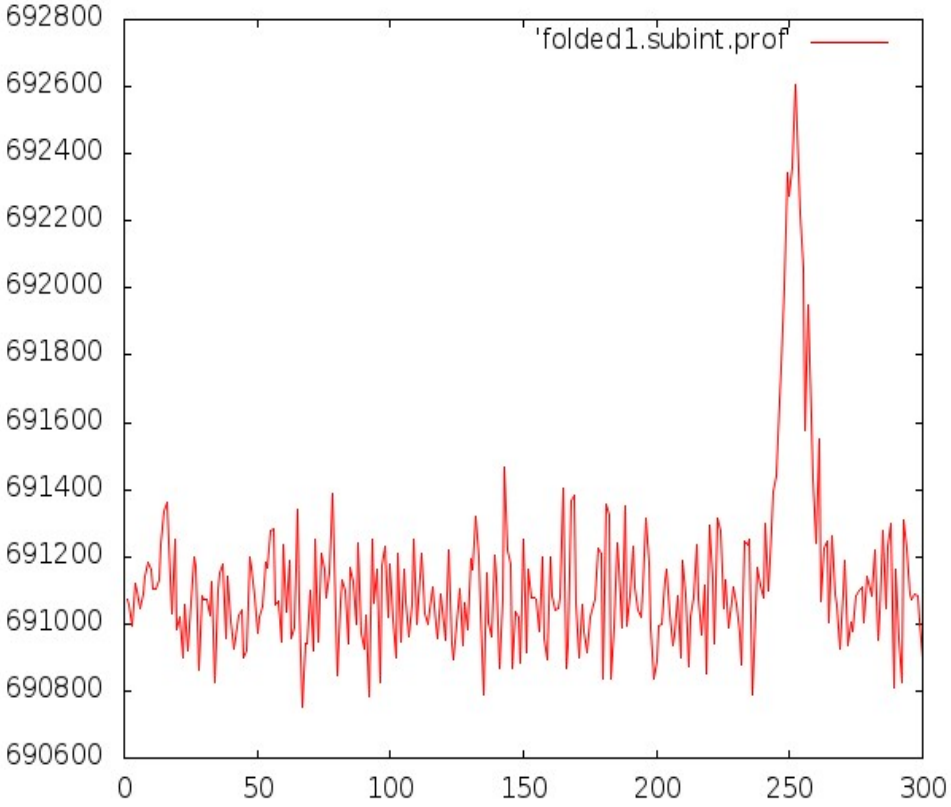
Resultant fit parameters

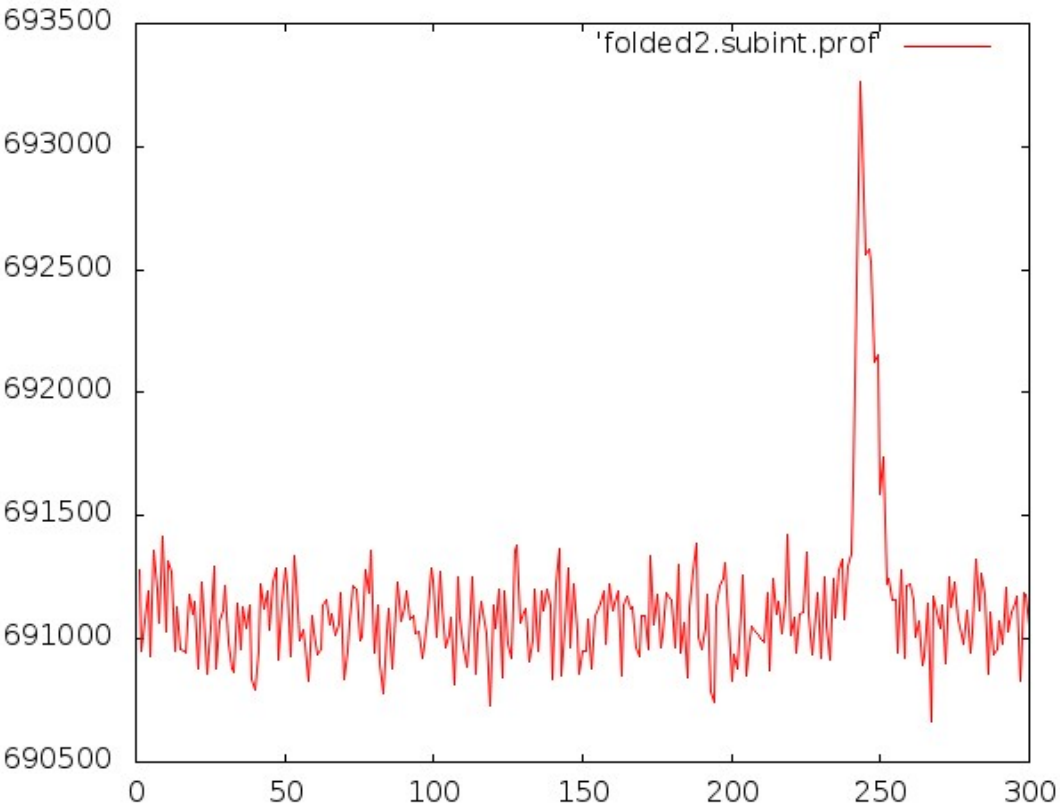
- Slope = 0.0238983 ms/s
- Fit Error = 0.002176 ms/s

Corrected period

- Multiply rough period by slope and modify
- Corrected period = 349.40835 ms
- Error = 0.00076 ms

Final results



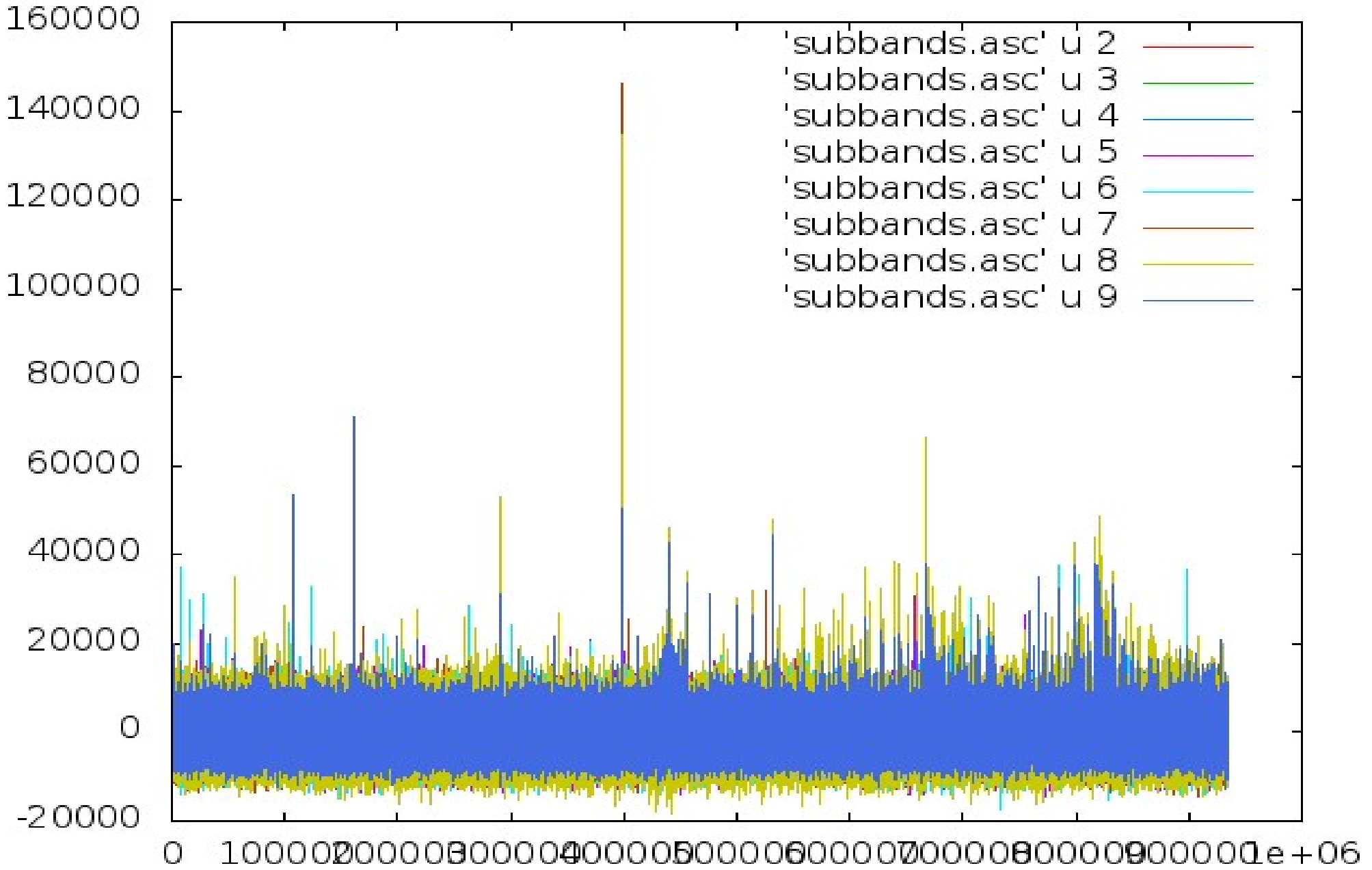


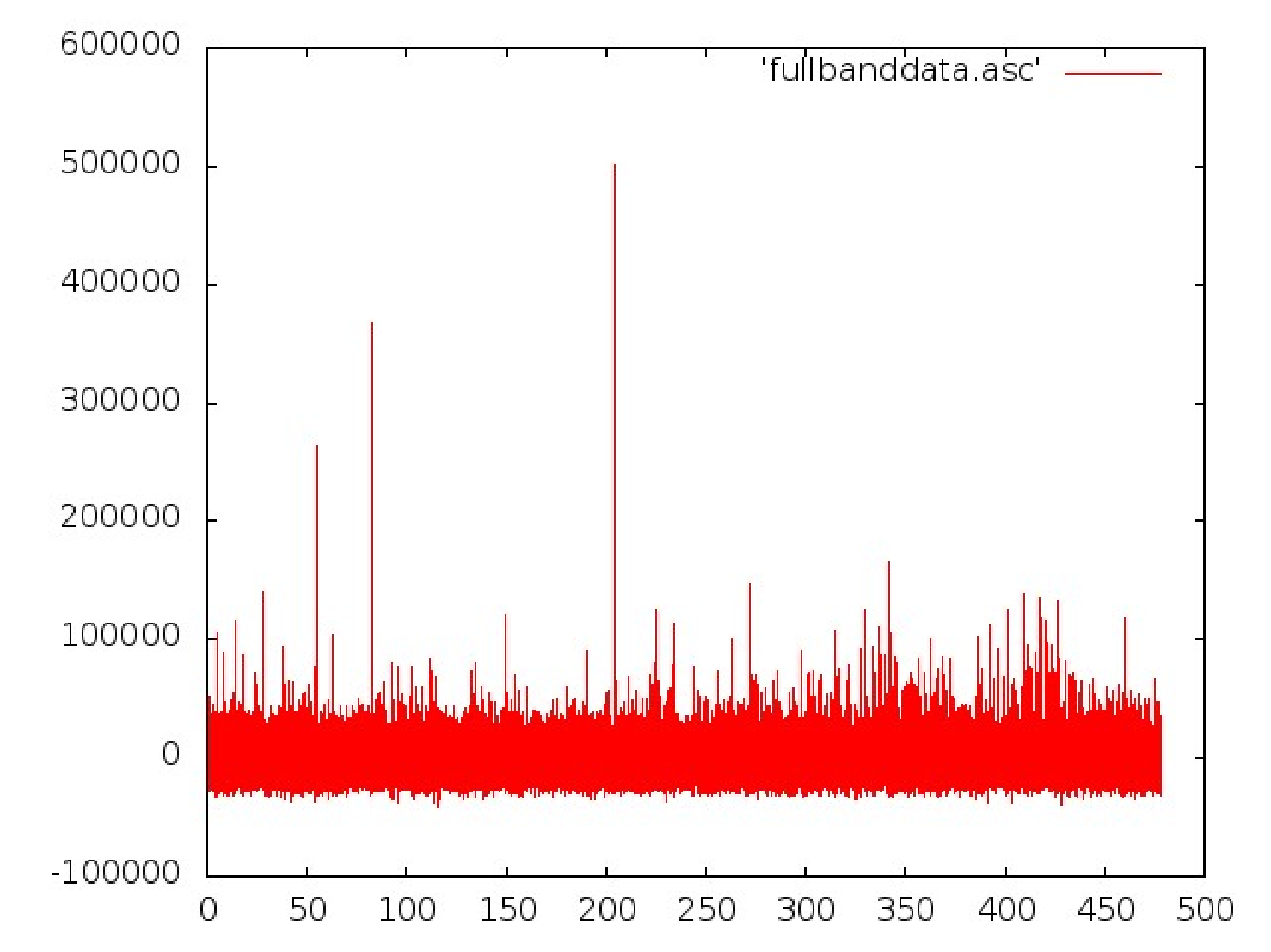
- Better SNR
- Noise decreases

Experiment 2 : DM of pulsar

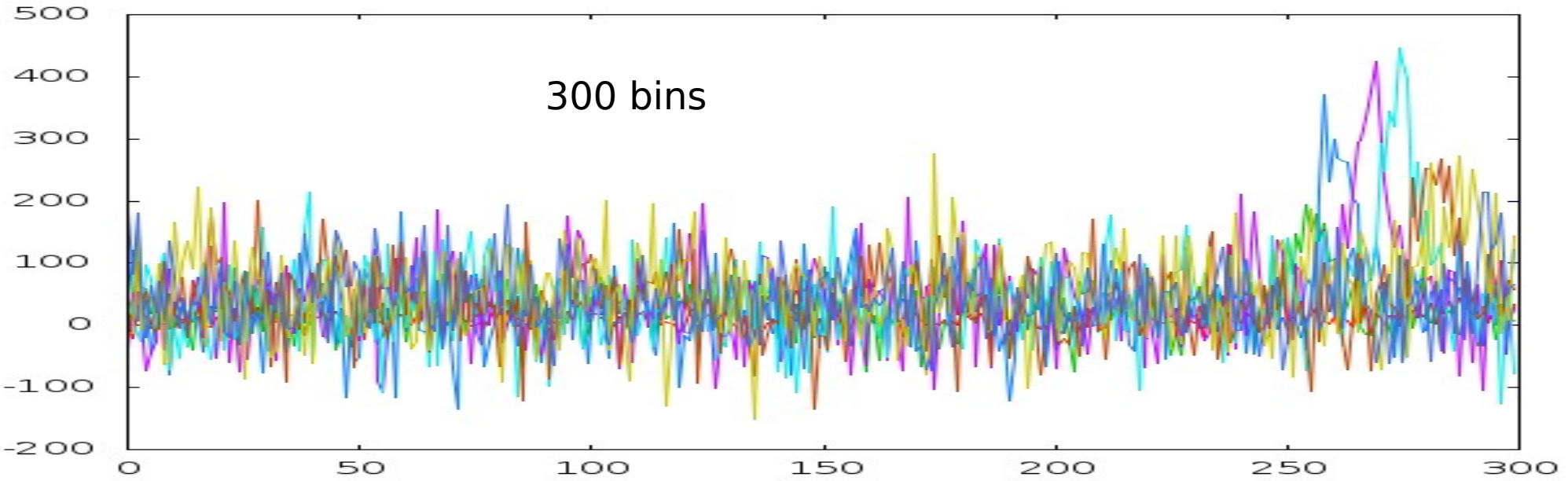
- Dedisperse (into 8 bands)
- Fold
- Fit Gaussian
- Fit Linear
- Calculate DM

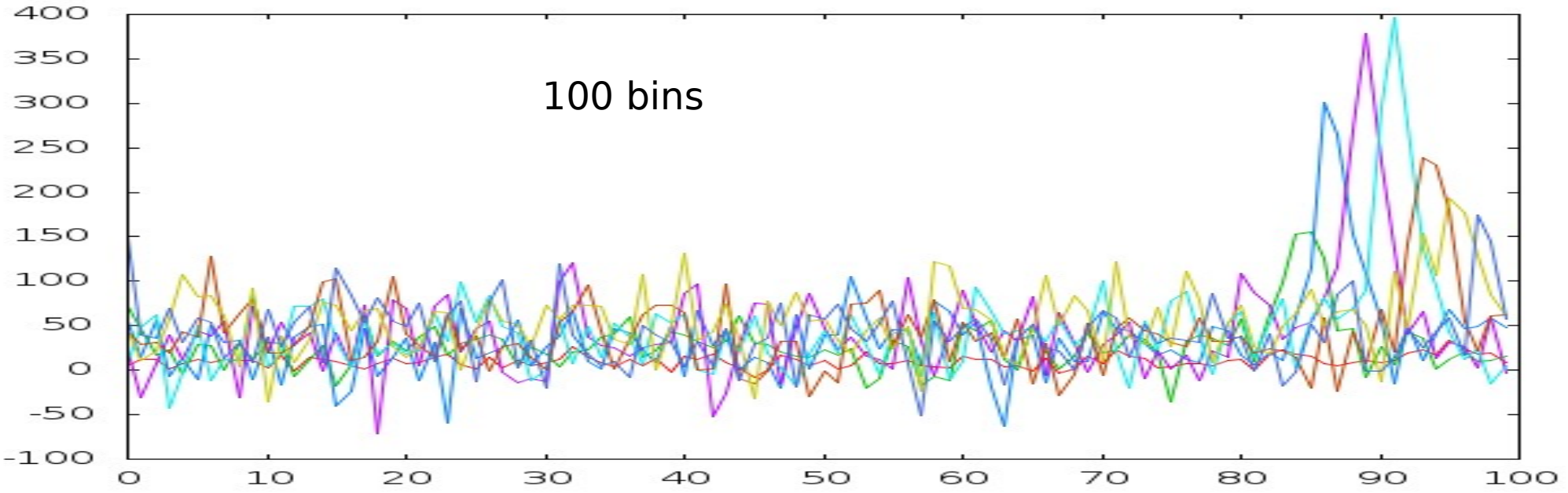
Post - dedispersion

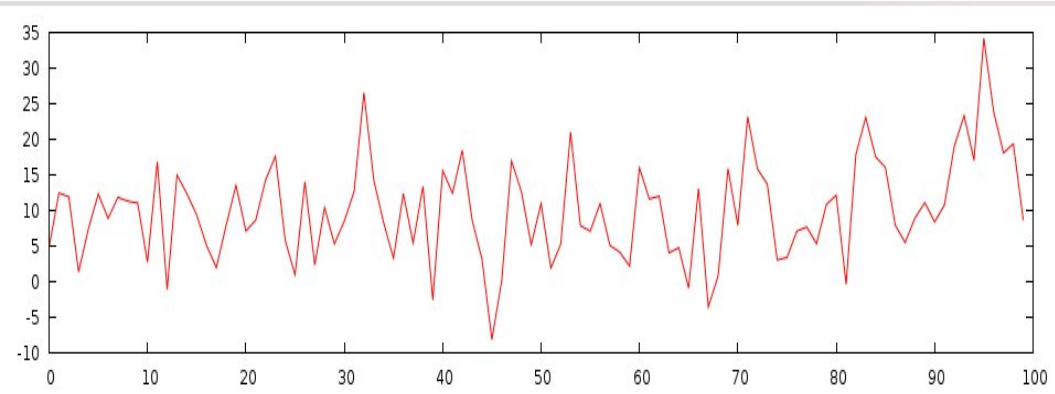
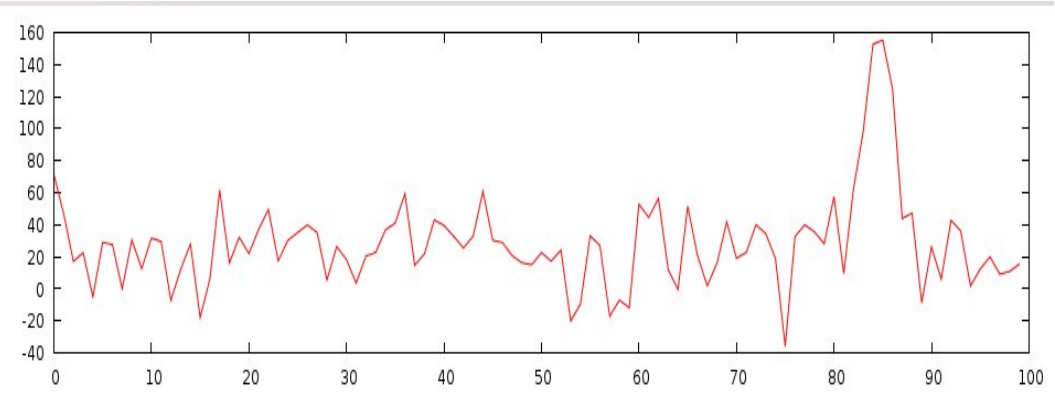
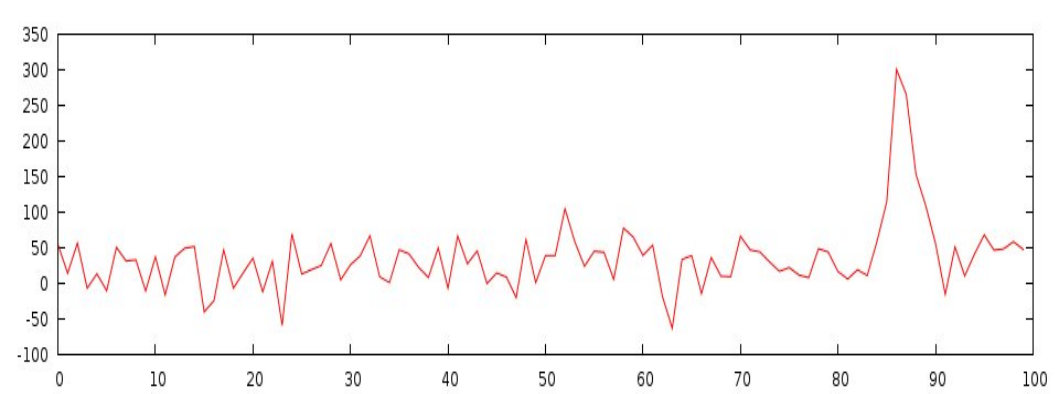
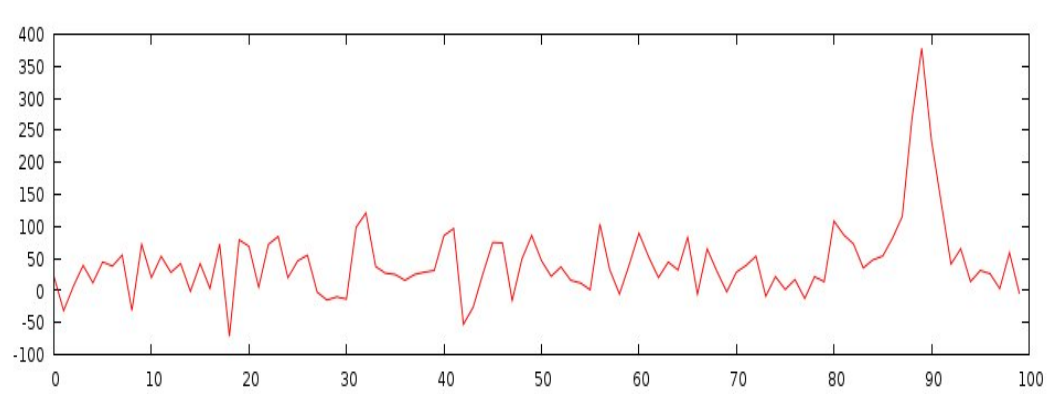
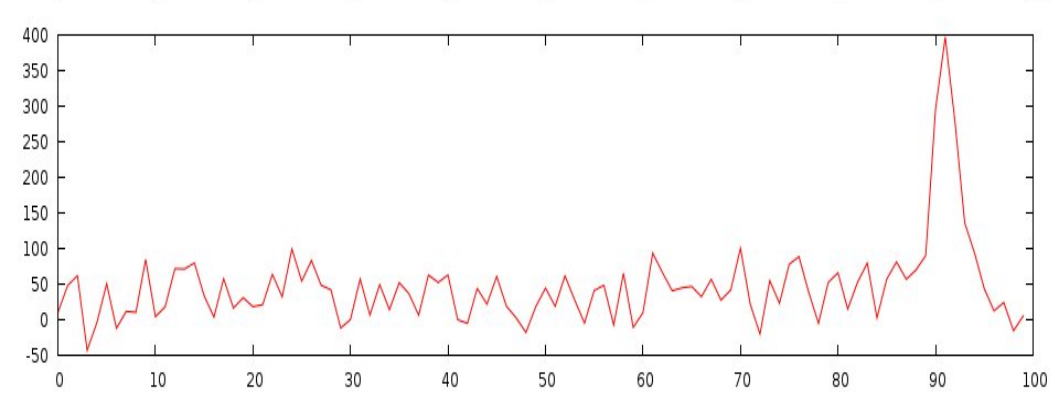
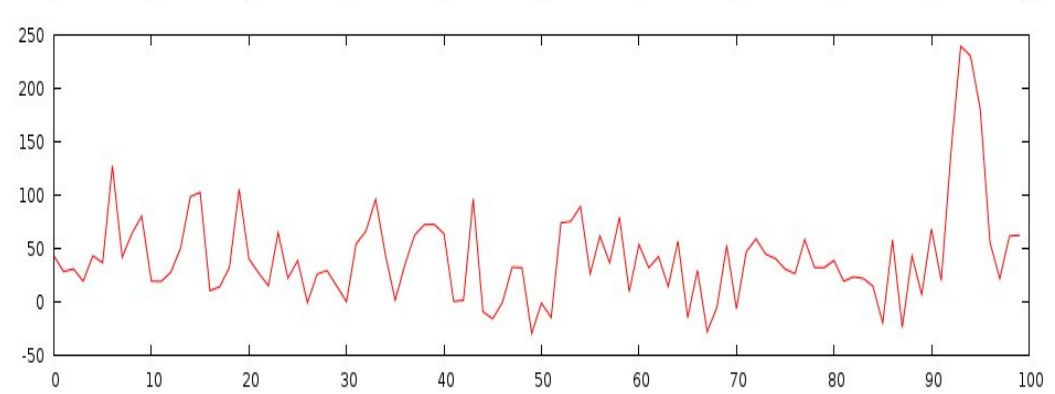
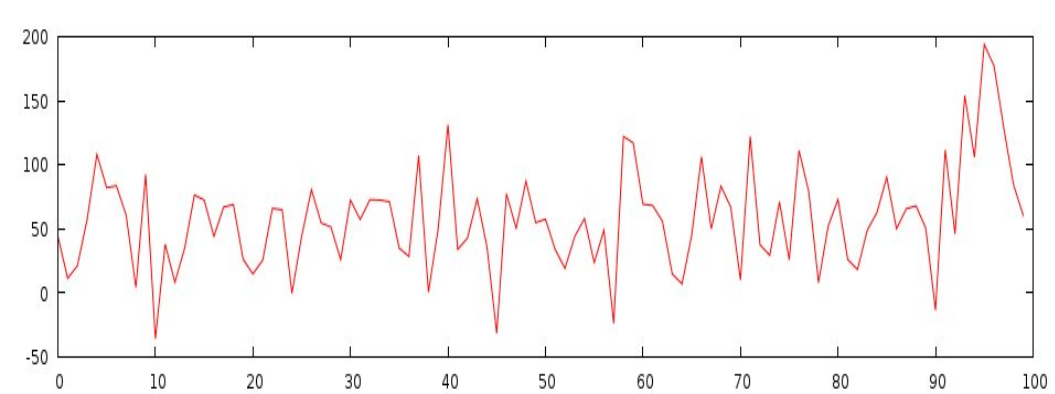
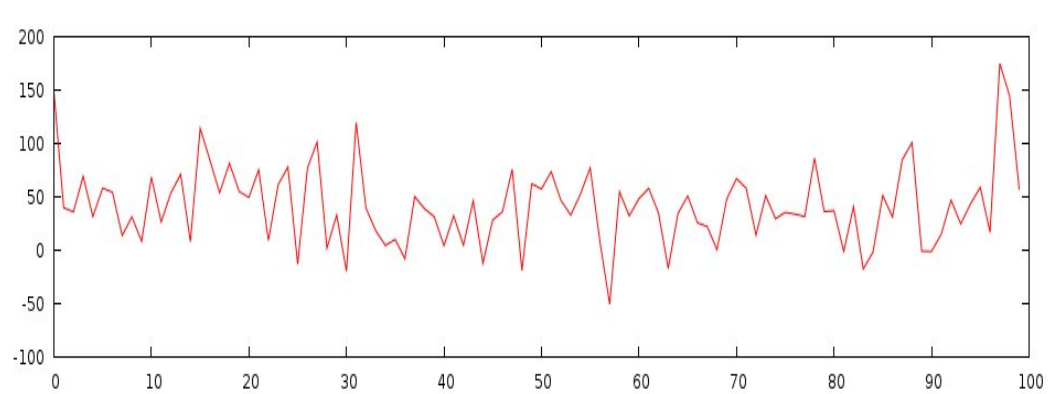



'fullbanddata.asc'
600000
500000
400000
300000
200000
100000
0
-100000
0
50
100
150
200
250
300
350
400
450
500

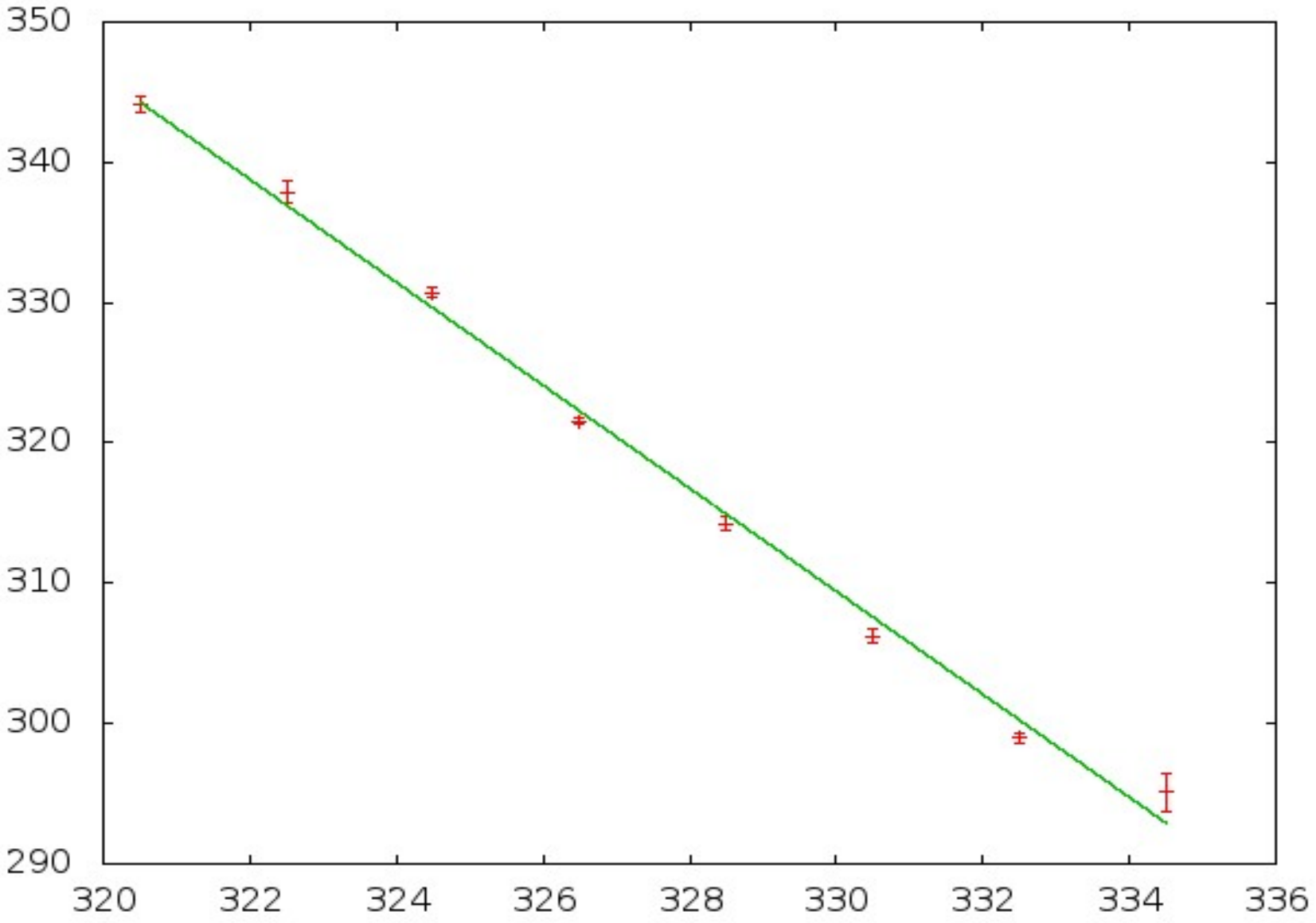
Post Folding





Linear fit of Gaussian centers



Linear fit parameters and DM

- Slope m = -3.68084 ms/MHz
- Error = 0.1053 ms/MHz
- Dispersion Measure = $k*S*(f_1^2 * f_2^2) / (f_1+f_2)$
- $K = 2.4103 * 10^{-4}\ MHz^{-2}\ cm^{-3}\ s^{-1}\ pc$
- Frequency f_1 = 320.5 MHz , f_2 = 334.5 MHz
- Estimated DM = 15.52 pc/cm^3
- Error = 0.44577 pc/cm^3

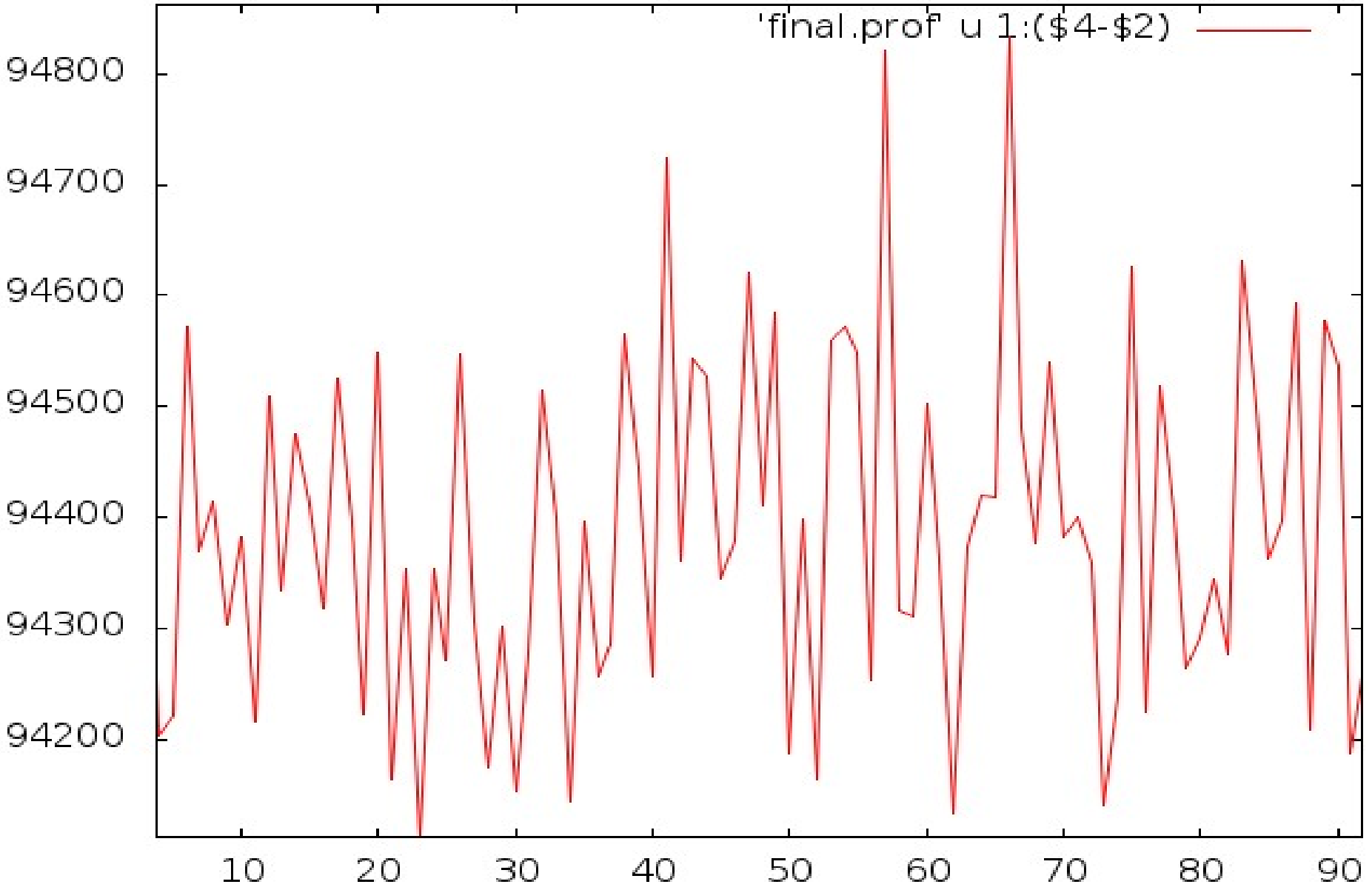
Experiment 3 : Flux calibration

- Statutory Warning – experiment done purely for the fun of it. No serious result expected/presented.
- Dedisperse pulsar, calibrator and offsource data
- Fold all three (with same parameters)
- Find mean of calibrator and offsource folds

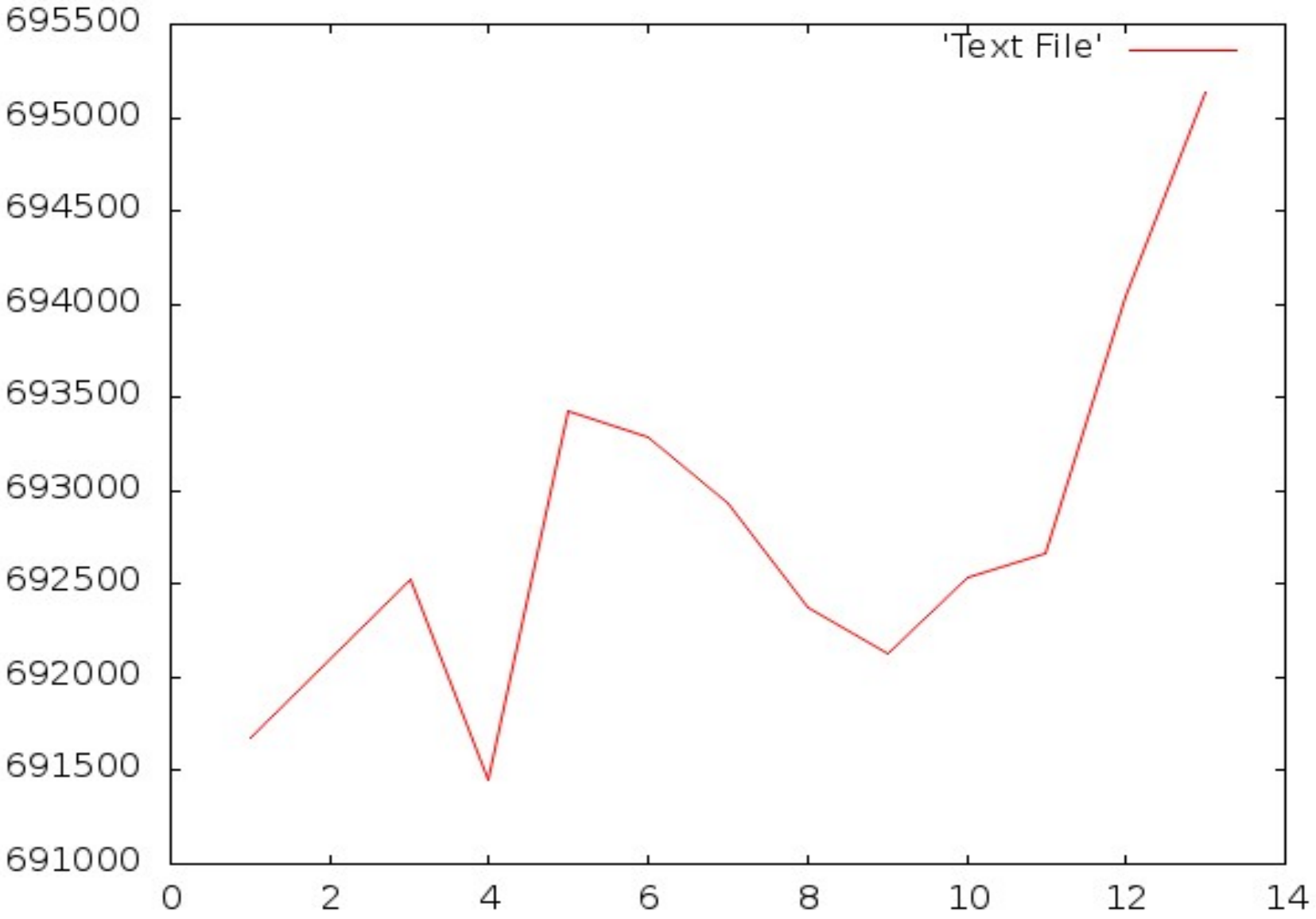
Fold Means

- Calibrator (of 27Jy) Mean = 681683
- Error = 9.696
- Offsource Mean = 587295
- Error = 10.81

Difference between calibrator and offsource



Modulation Index



Final Results

- Pulsar Name - B2310+42
- Period of pulsar = 349.40835 ± 0.00076 ms
- Dispersion measure = 15.52 ± 0.44577 pc/cm^3
- Flux Calibration and Modulation index coming soon.